Phase Transitions in Some Smectic Liquid Crystals

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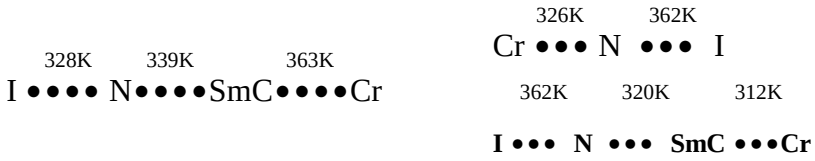
The investigations of structure changes under phase transitions were carried out for some smectic esters. Two isomers were objects of study in this work:

-X1 (***$C_8H_{17}O$ - C_6H_4 - COO - C_6H_4 - OC_6H_{13}***)
-X2 (***$C_6H_{13}O$ - C_6H_4 - COO - C_6H_4 - OC_8H_{17}***)

Despite close chemical composition, these two compounds have different mesomorphism nature. In other words, X1 is the enantiotropic and X2 is the monotropic liquid crystal.



Sample X1 Sample X2

In this work the differences in the Raman spectra (RS) for both samples were traced under both heating after fast cooling (V_{cool}>30 K per minute) and slow cooling (V_{cool} <1 K per minute) from isotropic phase. After that the correlation was established between such changes in RS and both intramolecular and intermolecular structure in the samples. Both general regularities and distinctions of structural transformations in the samples were noted.

The fast response of band corresponded to the C=O vibration to structural changes was noted. The splitting of this band was observed in SmC phase. Such splitting was explained in to ways: by existing of two conformers and by dimerization of molecules in SmC phase. Corresponding to this, two explanations of distinctions in mesomorphism nature were suggested: dimerizational and conformational.